MACHINE FOR FORMING AND WRAPPING STACKS OF PRODUCTS

TECHNICAL FIELD

The present invention relates to a machine for forming and wrapping stacks of products.

More specifically, the present invention relates to a machine for forming and wrapping stacks of products, of the type comprising a stacking plate rotating in steps about a respective axis; a loading station and an unloading station for said stacking plate; a number of radial seats formed on said stacking plate, each seat receiving a relative stack and having an inlet moving with the stacking plate along an annular path extending about said axis and through the loading and unloading stations; feed means for feeding the products successively to said inlet at the loading station and in a radial direction with respect to said axis; and unloading means for unloading the stacks successively at said unloading station.

The present invention may be used to particular advantage for wrapping sweets and similar, such as chocolates, confectionery, etc., to which the following

description refers purely by way of example.

BACKGROUND ART

In known machines, particularly sweet wrapping machines, of the above type, all the components upstream from the stacking plate are step-operated at a given fixed first rate, while the stacking plate and all the components downstream from it are step-operated at a fixed second rate depending on the first rate and on the number of sweets in each stack formed on the stacking plate.

Given the possibility of gaps in the succession of sweets fed to the stacking plate, incomplete stacks may be formed and fed to the follow-up stations, thus resulting either in faulty finished wrappings or in jamming, removal of which involves stopping, and so greatly impairing the efficiency of, the machine.

In known wrapping machines of the above type, any incomplete stacks can normally be detected, though only using relatively complex, high-cost detecting devices, which are not always reliable, and which increase the cost and reduce the output capacity of the machine.

DISCLOSURE OF INVENTION

It is an object of the present invention to provide a machine for wrapping products, in particular sweets, designed to eliminate the aforementioned drawbacks, and which is cheap and easy to produce.

More specifically, it is an object of the present invention to provide a machine for wrapping products, in

particular sweets, designed to detect incomplete stacks of products as simply as possible.

According to the present invention, there is provided a machine for wrapping products, as claimed in Claim 1 and, preferably, in any one of the Claims depending directly and/or indirectly on Claim 1.

BRIEF DESCRIPTION OF THE DRAWINGS

A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a schematic view in perspective, with parts removed for clarity, of a preferred embodiment of the machine according to the present invention;

Figure 2 shows a larger-scale, schematic plan view of a detail of Figure 1;

Figure 3 shows a section along line III-III in Figure 2;

Figure 4 shows a section along line IV-IV in Figure 2.

BEST MODE FOR CARRYING OUT THE INVENTION

Number 1 in Figure 1 indicates as a whole a machine for wrapping sweets 2, and comprising a known spacing plate 3 rotating (clockwise in the drawings) in steps about a vertical axis 4, and for receiving a random stream (not shown) of sweets 2 and arranging sweets 2 in an orderly succession along a spacing rim 5, which defines the outer periphery of spacing plate 3 and comprises a number of through seats 6 for receiving

respective sweets 2. Spacing rim 5 extends through a transfer station 7 where, by means of a known ejecting unit not shown, sweets 2 are expelled upwards from relative seats 6 and fed, in a direction 8 parallel to axis 4, to respective peripheral seats 9 of a transfer wheel 10 located alongside spacing plate 3 and rotating in steps about an axis 11 parallel to axis 4 to feed sweets 2 successively from transfer station 7 to a transfer station 12 diametrically opposite transfer station 7.

Known transfer wheel 10 defines an input wheel of a wrapping unit 13 for receiving sweets 2 successively from spacing plate 3, and for wrapping them in respective sheets 14 of wrapping material fed to transfer station 12 by a feed line 15, where a continuous strip 16 is unwound off a reel 17 and fed along a path comprising a substantially horizontal end portion 18 terminating at transfer station 12 and extending through a cutting station 19 where sheets 14 of wrapping material are cut off strip 16.

End portion 18 extends substantially in a plane defined by axes 4 and 11 just above seats 9, so as to feed each sheet 14 of wrapping material over a respective sweet 2 at transfer station 12, and define, with respective sweet 2, a group which is transferred, in a direction 20 parallel to transfer direction 8, and by means of a known push unit not shown, from transfer wheel 10 to a respective peripheral seat 21 on a further

transfer wheel 22, via a known wrapping unit 23, on which each sweet 2 is wrapped completely, in known manner, in a relative sheet 14 of wrapping material.

Transfer wheel 22, which is known and defines an output wheel of wrapping unit 13, is located directly over transfer wheel 10, and rotates, anticlockwise in Figure 1, in steps about a substantially horizontal axis 24 to feed the wrapped sweets 2, indicated 2a, successively to a loading station 25 of a stacking plate 26, which rotates, anticlockwise in Figure 1, in steps about a respective axis 27 tilted substantially 30° upwards towards spacing plate 3 with respect to direction 20. Stacking plate 26 lies in a radial plane with respect to transfer wheel 22, and is located on the opposite side of transfer wheel 22 to spacing plate 3, and over end portion 18 of feed line 15.

At loading station 25, a known push unit (not shown) expels sweets 2a from relative seats 21, and feeds them successively, in a radial direction 28 with respect to stacking plate 26, through the inlets 29 of a number of radial seats 30 on stacking plate 26, to form, inside each seat 30, a stack 31 comprising a given number of sweets 2a.

Stacking plate 26 feeds each inlet 29 in steps along an annular path P extending through loading station 25 and a downstream reject station 32, and transfers stacks 31 about axis 27 and between loading station 25 and an unloading station 33 downstream from reject station 32

and at 90° with respect to loading station 25. At unloading station 33, each stack 31 is expelled, by unloading means comprising an ejecting member 34, from relative seat 30 in a direction 35 parallel to axis 27, and is fed to a wrapping unit 36 for successively receiving stacks 31 from stacking plate 26, and for wrapping them in respective sheets 37 of wrapping material fed by a feed line 38, where a continuous strip 39 is unwound off a reel 40 and fed over seats 30 via a cutting station 41, where sheets 37 of wrapping material are cut off strip 39. On wrapping unit 36, each sheet 37 is wrapped in known manner about relative stack 31 to form a wrapped stack 42, which is transferred in known manner from wrapping unit 36 to an unloading conveyor 43.

As shown in Figure 2, stacking plate 26 comprises a disk 44 having an equal number of (in the example shown, eight) radial lobes 45, which are equally spaced about axis 27 and have respective radial slots 46, each aligned with another radial slot 46 to define a pair 47 of radial slots 46 communicating and aligned with each other along a respective diameter of disk 44. Disk 44 has a central opening 48 occupied partly by an annular body 49 fitted, in a manner not shown, to a shaft (not shown and coaxial with axis 27) for moving stacking plate 26 in steps about axis 27 and anticlockwise in Figure 1. Annular body 49 has stop means 50 comprising a number of radial appendixes 50, each of which is fitted inside an inner end portion of a respective radial slot 46 to define,

inside radial slot 46, a respective seat 30, the inlet 29 of which coincides with the outer end of relative radial slot 46.

Each pair 47 of radial slots 46 is fitted inside in sliding manner with a slide or counter-pusher 51 comprising a rod 52 fitted in sliding manner to annular body 49 and to relative appendixes 50, and having, at each end, a transverse head 53 fitted in sliding manner inside relative seat 30. Rod 52 is twice as long as a radial slot 46 minus the length of a stack 31, so that, when one of heads 53 is in an inner limit position at the end of relative radial seat 30 and contacting the free end of relative radial appendix 50, the other head 53 is in an outer limit position at the inlet 29 of relative radial slot 46.

Each head 53 has a bottom edge contacting a radial strip 54 defining a bottom wall of relative seat 30. More specifically, each strip 54, which extends radially, defines, at the bottom of relative seat 30, due longitudinal slots 55 on opposite sides of relative strip 54.

Stacking plate 26 comprises a brake member 56 for braking the travel of counter-pushers 51 along relative pairs 47 of radial slots 46, and in turn comprising, for each counter-pusher 51, a leaf spring 57 fitted at central opening 48 with its concavity facing downwards, and with its opposite ends pressed onto relative rod 52. As shown in Figure 3, leaf springs 57 are connected to

one another by a central bolt 58, and the pack of leaf springs 57 so formed is pressed onto rods 52, which intersect at central opening 48, by a bell 59 coaxial with axis 27 and fitted to the top surface of disk 44 by a number of screws 60 (Figure 2).

As shown more clearly in Figure 2, loading station 25, reject station 32, and unloading station 33 are arranged successively along an arc, which forms part of path P, is subtended by a central angle of less than 180° and of 90° in the example shown, and extends along a guide 61 located outwards of the outer periphery of disk 44 to retain stacks 31 inside relative seats 30 as stacking plate 26 is fed in steps between loading station 25 and unloading station 33.

As shown more clearly in Figure 3, at reject station 32, guide 61 is fitted with a conduit 62 having an inverted-U-shaped cross section, and extending radially with respect to stacking plate 26 and over disk 44. A first end of conduit 62 faces axis 27 and the outlet of an end nozzle 63 of a compressed-air circuit 64; and a second end of conduit 62, opposite the first end, is aligned with the inlet of a reject header 65 for stacks 31.

First unloading means 66 are located beneath disk 44 at reject station 32, and comprise an ejecting member 66 substantially identical with ejecting member 34, and which, like ejecting member 34, comprises an actuator 67 parallel to axis 27 and having an output member defined

at the end portion by a fork 68 facing disk 44 and comprising two plates 69, which are parallel to each other and to axis 27, and, when raised by relative actuator 67, engage slots 55 of a respective seat 30 to lift relative stack 31 up off disk 44.

More specifically, at reject station 32, plates 69 of ejecting member 66 lift relative stack 31 into conduit 62 and into a position facing nozzle 63, which "shoots" it into reject header 65. At unloading station 33, on the other hand, ejecting member 34 lifts relative stack 31 in direction 35 into a pickup position for removal by a relative known gripping head (not shown) of wrapping unit 36.

As shown in Figures 2 and 3, machine 1 also comprises a control device 70 for controlling said first unloading means 66. Control device 70 comprises a preferably, though not necessarily, inductive proximity sensor 71, which is located at a detecting station 72 diametrically opposite loading station 25, and is activated by a head 53 of a relative rod 52 when the head 53 is in the outer limit position.

Operation of stacking plate 26 will now be described with reference to one seat 30 and to the seat, hereinafter indicated 30a, coaxial with seat 30, and as of the instant in which the seat 30 considered is arrested at loading station 25 with relative head 53 in the outer limit position.

As of this instant, seat 30 begins receiving

relative wrapped sweets 2a, which are removed, by a known transfer device not shown, from respective peripheral seats 21 on transfer wheel 22, and are fed successively in direction 28 through inlet 29 of seat 30. As each sweet 2a is inserted inside seat 30, relative counter-pusher 51 slides, in opposition to brake member 56, by a length equal to the thickness of the inserted sweet 2a, so that, upon insertion of a given n number of sweets 2a equal to the number of sweets 2a in each stack 31, the head 35 mounted to slide inside seat 30 reaches its inner limit position contacting the free end of relative radial appendix 50, while the other head 53, mounted to slide inside seat 30a, reaches its outer limit position, and activates sensor 71, which disables operation of reject station 32 at the next step.

In connection with the above, it should be pointed out that proximity sensor 71 is only activated when stack 31 has actually been completed.

The next step of stacking plate 26 brings the seat 30 considered to a stop at reject station 32.

If the relative stack 31 is incomplete, e.g. due to gaps along wrapping unit 23, so that sensor 71 is not activated to disable reject station 32, ejecting member 66 is automatically activated to lift the incomplete stack 31 out of seat 30, and circuit 64 is activated to "shoot" stack 31 into reject header 65. Conversely, i.e. if sensor 71 is activated, stack 31 remains inside seat 30, and is fed, at the next step of stacking plate 26, to

unloading station 33, where it is lifted by ejecting device 34 and transferred to wrapping unit 36, leaving counter-pusher 51 in its former position, in which, the head 53 housed inside the seat 30 considered is in the inner limit position, and the head 53 housed inside relative seat 30a is in the outer limit position.

A further two steps of stacking plate 26 bring the by now empty seat 30 to detecting station 72, and the relative empty seat 30a to loading station 25 to start another operating cycle identical with that described relative to relative seat 30.